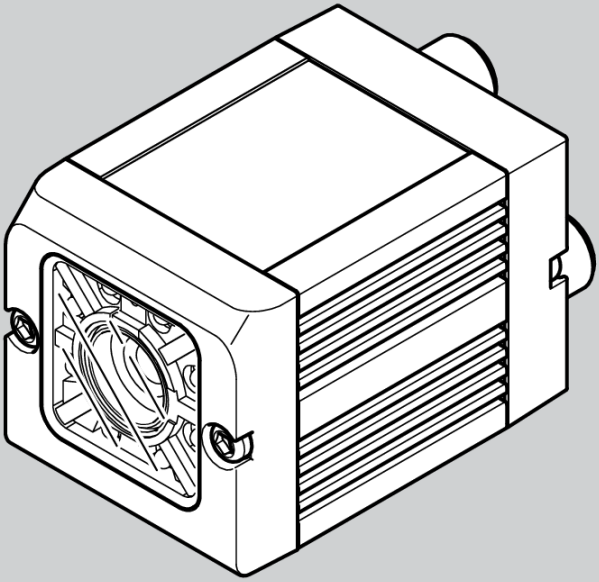
Vision sensor

SBSI-EN

FESTO

Mounting and
operating instructions



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For use in class 2 circuits

For use in NFPA 79 Applications only

Table of Contents

1 General Information and Safety 5
1.1 Safety notes 5
1.2 Components supplied 5
1.3 Requirements for use 5

2 Intended Use 6
2.1 Field of application 6
2.2 Functions overview 7
2.3 Sensor types 8
2.3.1 Object detection 8
2.3.2 Code Reader 8
2.4 Field of view / Depth of view 10

3 Installation 13
3.1 Mechanical Installation 13
3.1.1 Arrangement for dark-field illumination 13
3.1.2 Arrangement for bright-field illumination 14
3.1.3 Alignment for a vertical illumination 15
3.1.4 Assembly Vision Sensor - Mounting bracket SBAM-C6-CP 16
3.2 Electrical installation 16
3.2.1 Connection possibilities 17
3.2.1.1 LED Display 17
3.2.1.2 Focussing screw 18
3.2.1.3 24 V DC Connection 18
3.2.1.4 LAN Connection 18
3.2.1.5 Data Connection 18
3.2.2 Plug connections 19
3.2.2.1 PIN assignment, connection 24 V DC 19
3.2.2.2 PIN assignment, connection LAN 19
3.2.2.3 PIN assignment DATA *A) 20
3.2.2.4 Exemplary connection plan and software settings for the following setup: 20
3.2.2.5 Electrical connection supply voltage and shield 21
3.2.2.6 Electrical connection PNP / NPN 21
3.3 Network settings, Short reference 22
3.3.1 Basic settings for PC and Vision Sensor 22
3.3.2 Direct Connection - Setting the IP Address of the PC 23
3.3.3 Network Connection - Setting the IP address of the Vision Sensor 24

4 Vision Sensor – Operating- and configuration software 26
4.1 Vision Sensor – Operating- and configuration software - Overview 26
4.1.1 Structure of PC software 26
4.1.2 Context help 26
4.2 Vision Sensor – Operating- and configuration software – Short introduction 27
4.2.1 Vision Sensor, Short introduction, Starting the software 27
4.2.2 Vision Sensor Device Manager: Open sensors or sensor simulation / Passwords 27
4.2.3 Passwords 29
4.2.4 Password levels: 29
4.3 Vision Sensor Configuration Studio: Setting sensor, Job 31
4.3.1 Job Setup 32

4.3.2 Alignment settings 33
4.3.3 Detector settings 34
4.3.4 Output, I/O and data output 35
4.3.5 Result 37
4.3.6 Start sensor 38
4.4 Vision Sensor Visualisation Studio, display images and results 39
5 Type key 40
6 Technical Data 41

1 General Information and Safety

1.1 Safety notes

Before starting the Vision Sensor, read these instructions carefully, ensure that you have understood them and comply with them at all times.
The Vision Sensor should only be connected by a qualified electrician.
Do not tamper with or make alterations on the unit!
The Vision Sensor is not a safety-critical component and its use is prohibited under conditions where the safety of persons may depend on its function.
The IP address set for the Vision Sensor should be marked on the enclosed label. After installation, stick the label on the sensor in a clearly visible position.
The IP address of the Vision Sensor must be used once only in any network.
For Use with any Listed (CYJV) cable assembly.

1.2 Components supplied

- Vision Sensor including integrated illumination.
- CD-ROM with Computer software and Operating instructions.
- Operating instructions, mounting clamp, Allen key, screwdriver, and protective cap for Ethernet plug.

1.3 Requirements for use

Configuration of the Vision Sensor requires a standard PC/Notebook (at least Pentium 4, 1GHz and 512 MB RAM, with Microsoft Windows XP SP3, Vista or Windows 7) with network connection or a network with TCP-IP protocol. We recommend a Pentium 4 Dual Core > 2GHz and 1GB RAM, for Windows Vista or Windows 7. We recommend a screen resolution of min. 1024 x 768 pixels. A basic knowledge of computers is also required. The Vision Sensor is supplied with the IP address 192.168.100.100 and a sub-net mask 255.255.255.0. The Vision Sensor is operated independently of a PC or PLC. A PC/notebook is only necessary for configuration of the Vision Sensor.

Attention must be paid to sufficient and constant object illumination to ensure reproducible results and avoid malfunction.

Reflections or varying incident light may affect detection results. If necessary, use an external light source and/or light-screening / shrouding devices to exclude incident light

2 Intended Use

2.1 Field of application

The Vision Sensor is an optical sensor and uses several evaluation methods according to the version: pattern recognition, contrast detection, grey level, contour detection, barcode or Data Matrix code reading. The product is designed for industrial use only. In residential areas possibly additional measures for noise suppression must be done.

Object:

The Vision Sensor precisely detects faulty parts, parts in the wrong place, at the wrong angle or in the wrong order or a combination of all of these. A total of five detectors are available for inspection tasks and interpretation: pattern recognition, contour detection, brightness, grey level and contrast detection. The Vision Sensor also offers alignment: it is thus now also possible to reliably detect those features which do not appear with repeated accuracy in the taught position. All interpretation is carried out relative to the actual position and angle of the part without having to define an independent characteristic for each possible position. This high capacity tool also enables you to solve demanding pick and place applications.

Code Reader:

Identification of products, components or packaging from printed or directly marked – punched or laser-etched – codes is common practice in many sectors of industry today. The Vision Code Reader immediately detects which part is in front of it: it can easily read numerous types of barcodes as well as printed and directly marked data matrix codes according to ECC 200 standard, and this on any base (metal, plastic, paper, glass). The sensor can even routinely decipher askew or warped codes or codes on convex, reflective or transparent surfaces. The Vision Code Reader assesses the quality of your printed or directly marked data matrix codes using standardised ISO and AIM quality parameters. This enables you to introduce early correctional measures and thus avoid rejects due to illegible codes.

The Vision Sensor range is an economic alternative to conventional image processing systems.

2.2 Functions overview

Characteristics Vision Sensor Object / Code Reader

Function	Object Std.	Code Reader Std.
Frames per second	50	50
Number of Jobs	8	8
Alignment	Contour only	
Number of detectors	32	2
- Pattern matching (X-, Y- translation)	X	
- Contour matching (X-, Y- translation and rotation)	X	
- Grey level	X	
- Contrast	X	
- Brightness	X	
- Data code		X
- Barcode		X
4 digital outputs, 2 inputs, PNP or NPN	X	X
Free definable digital In- / Outputs, PNP or NPN	2	2
Free shape of ROI	contour only	
Timeout, specified time response	X	X
Variable resolutions	X	X
Illumination quadrant controlled	X	X
Image recorder	X	X
Ethernet interface	X	X
RS422 / RS232 interface		X
EtherNet/IP interface	X	X
Sensor monitoring by Viewer, Job-Upload	X	X
R3 integrated 6 / 12	X / X	X / X

2.3 Sensor types

2.3.1 Object detection

Part no.	Type	Optics	Depth of focus	Internal illumination	min. operating distance / mm *1	min. Field of view mm x mm
R3 Standard White						
2942261	SBSI-Q-R3B-F6-W	6	Normal	White	6	5 x 4
2942262	SBSI-Q-R3B-F12-W	12	Normal	White	30	8 x 6
R3 Standard IR						
2942265	SBSI-Q-R3B-F6-NR *2	6	Normal	InfraRed	6	5 x 4
2942266	SBSI-Q-R3B-F12-NR *2	12	Normal	InfraRed	30	8 x 6

*1 For longer operating distances (from approx. 200 mm) external illumination may be necessary.

*2 External IR illumination is only possible with IR sensors or C-Mount sensors.

2.3.2 Code Reader

Part no.	Type	Optics	Depth of focus	Internal illumination	min. operating distance / mm *1	min. Field of view mm x mm
R3 Standard White						
2930232	SBSI-B-R3B-F6-W	6	Normal	White	6	5 x 4
2930233	SBSI-B-R3B-F12-W	12	Normal	White	30	8 x 6
2930242	SBSI-B-R3B-F6-W-D	6	Enhanced	White	6	5 x 4
2930243	SBSI-B-R3B-F12-W-D	12	Enhanced	White	30	8 x 6
R3 Standard Red						
2930234	SBSI-B-R3B-F6-R	6	Normal	Red	6	5 x 4
2930235	SBSI-B-R3B-F12-R	12	Normal	Red	30	8 x 6
2930236	SBSI-B-R3B-F6-R-D	6	Enhanced	Red	6	5 x 4
2930237	SBSI-B-R3B-F12-R-D	12	Enhanced	Red	30	8 x 6
R3 Standard IR						
2930238	SBSI-B-R3B-F6-NR *2	6	Normal	InfraRed	6	5 x 4
2930239	SBSI-B-R3B-F12-NR *2	12	Normal	InfraRed	30	8 x 6

Part no.	Type	Optics	Depth of focus	Internal illumination	min. operating distance / mm *1	min. Field of view mm x mm
2930240	SBSI-B-R3B-F6-NR-D *2	6	Enhanced	InfraRed	6	5 x 4
2930241	SBSI-B-R3B-F12-NR-D *2	12	Enhanced	InfraRed	30	8 x 6

*1 For longer operating distances (from approx. 200 mm) external illumination may be necessary.

*2 External IR illumination is only possible with IR sensors or C-Mount sensors.

2.4 Field of view / Depth of view

Field of view R3 6mm lens, internal

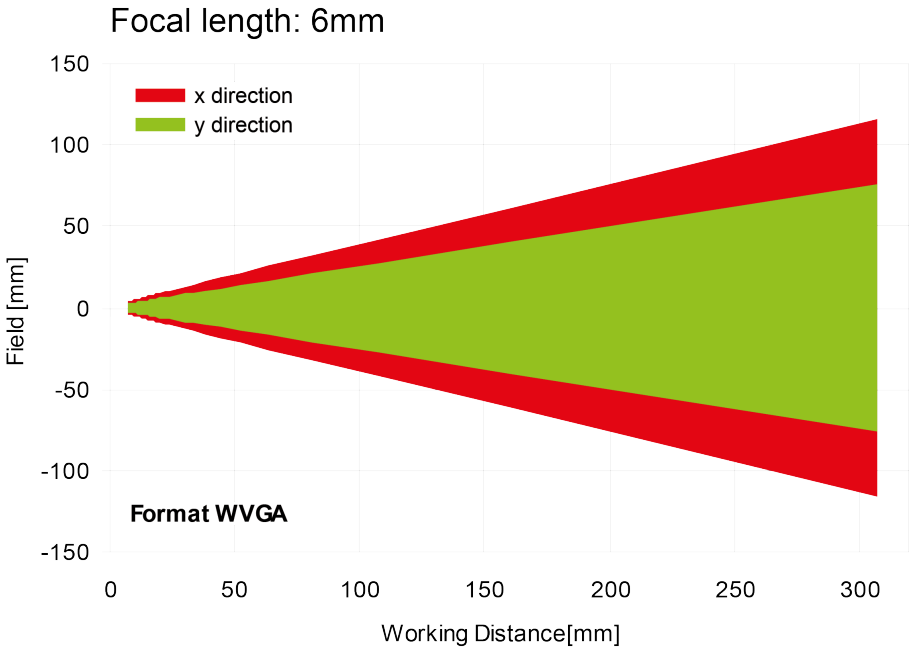


Fig. 1: Field of view R3 6mm lens, internal

Field of view R3 12mm lens, internal

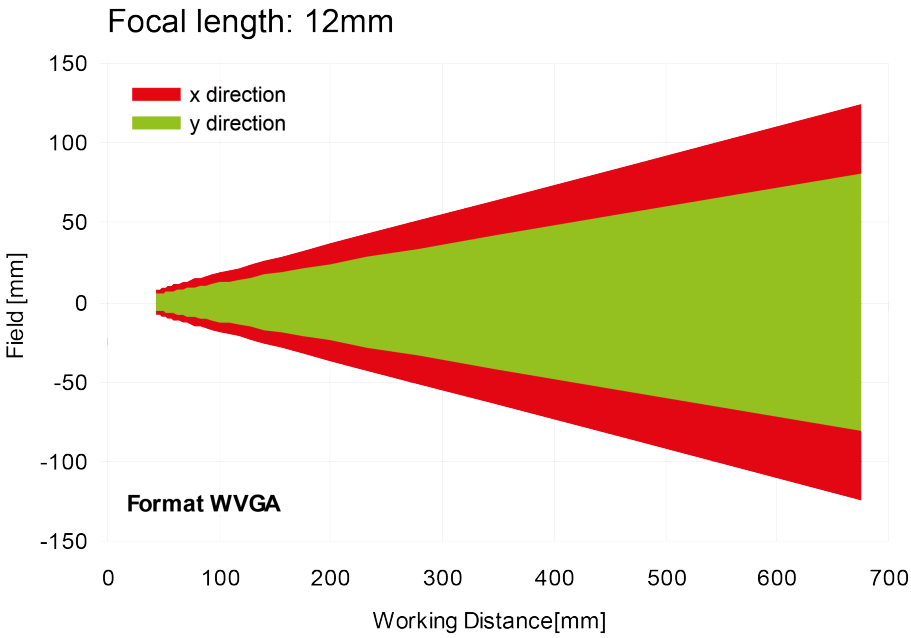


Fig. 2: Field of view R3 12mm lens, internal

Depth of view R3 6mm lens internal, normal

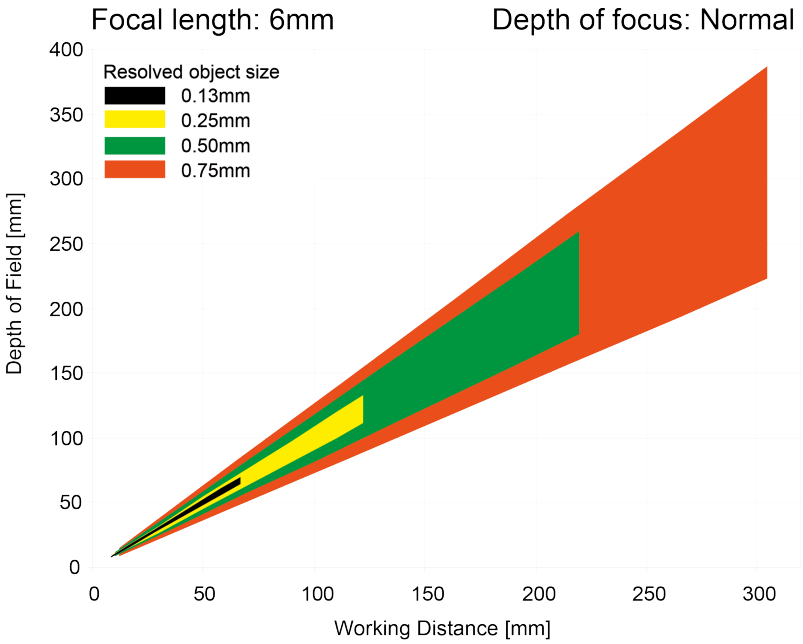


Fig. 3: Depth of view R3 6mm lens internal, normal

Depth of view R3 6mm lens internal, enhanced

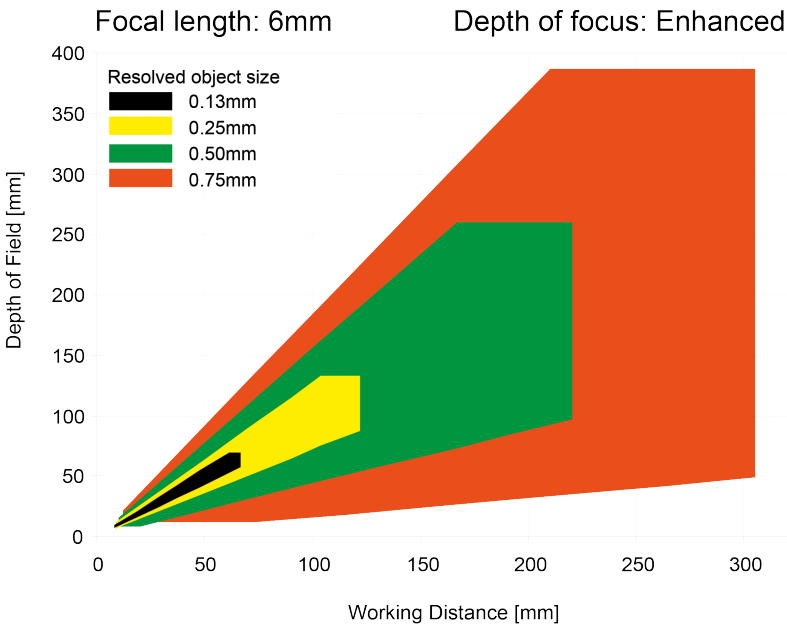


Fig. 4: Depth of view R3 6mm lens internal, enhanced

Depth of view R3 12mm lens internal, normal

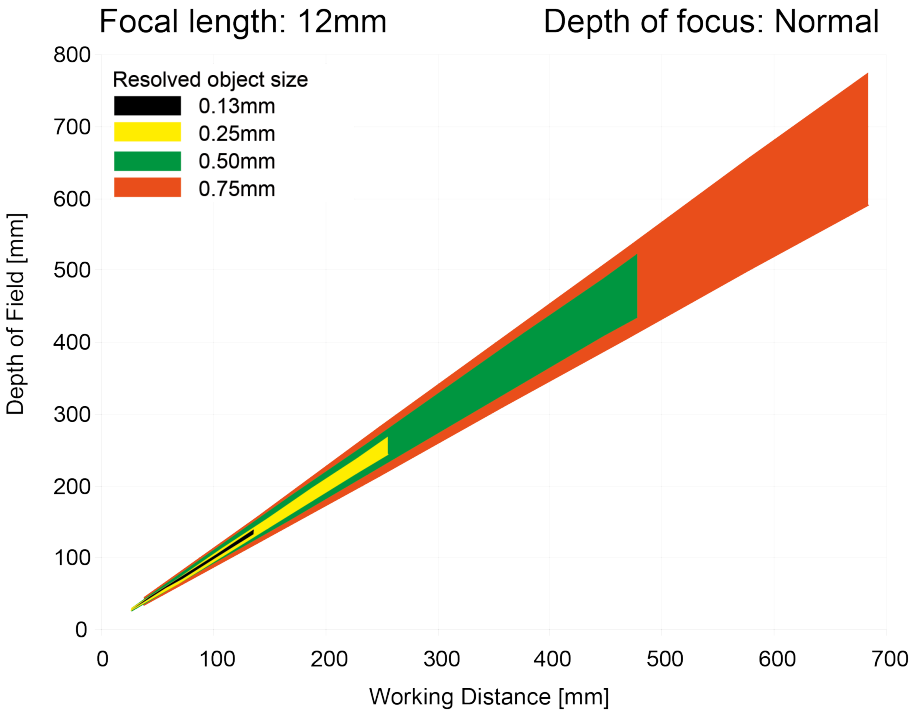


Fig. 5: Depth of view R3 12mm lens internal, normal

Depth of view R3 12mm lens internal, enhanced

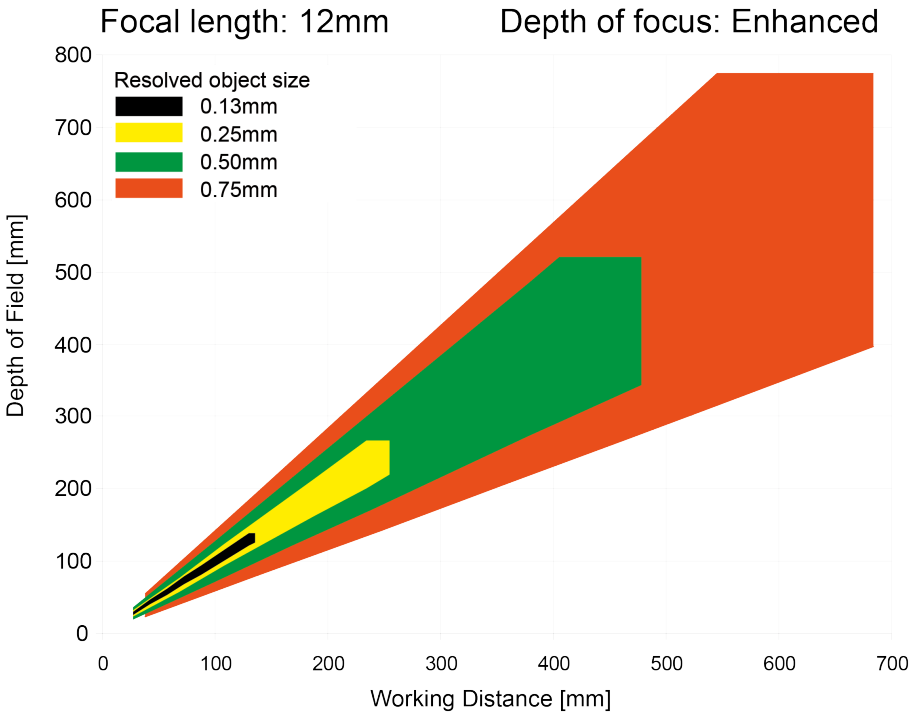


Fig. 6: Depth of view R3 12mm lens internal, enhanced

3 Installation

3.1 Mechanical Installation

To ensure maximum accuracy of detection, the Vision Sensor should be protected from vibration. Secure the supply and I/O cables with cable binders to prevent crushing or slipping.
Select a position for the Vision Sensor in which interfering factors such as slight differences in the position of the object or variations in illumination have little or no effect.
Screw the Vision Sensor onto the mounting clamp (supplied with the unit) and then onto a suitable object.
Use only the mounting clamp MK 45 (no. 543-11000) or the mounting hinge MG2A (no.543-11023).

3.1.1 Arrangement for dark-field illumination

For the prevention of direct reflections and accentuation of edges etc.

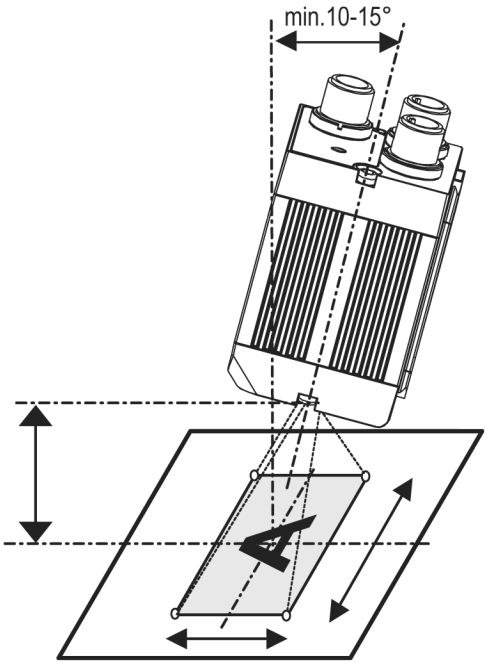


Fig. 7: Arrangement for dark-field illumination

3.1.2 Arrangement for bright-field illumination

For transmitted light/measuring tasks or for the accentuation of highly-reflective objects

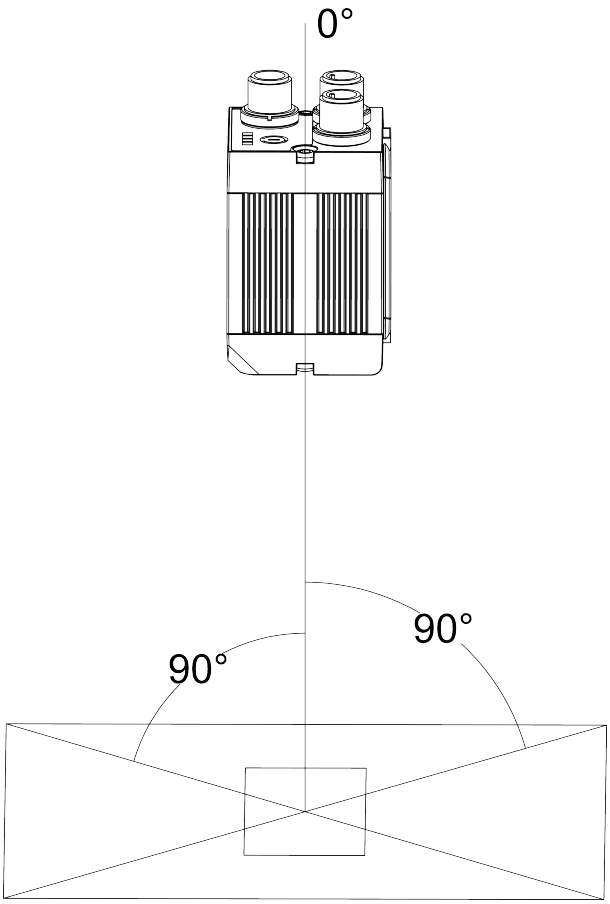


Fig. 8: Arrangement for bright-field illumination

Observe the object clearance given in the table Field of View / Working Distance.

To avoid interfering reflection from the detection object, align the Vision Sensor at an angle of approx. 10°- 15° with reference to the optical axis.

Fine adjustment

Important: Fine adjustment of the Vision Sensor should not be carried out until after electrical connection and start-up (PC software installation).

3.1.3 Alignment for a vertical illumination

In order to assure the absolutely vertical alignment of the Vision Sensor to the object surface, put a piece of reflective foil or a mirror on top of the object and start the Vision Sensor operating software. For an image that is continually updated, select trigger mode „free run ? “ and image update: „continuous ?“. Then align the sensor to the reflective surface / the mirror as vertical as possible until the integrated illumination LEDs are directly dazzling in the image of the user interface (Arrangement for bright-field illumination (Page 14)).

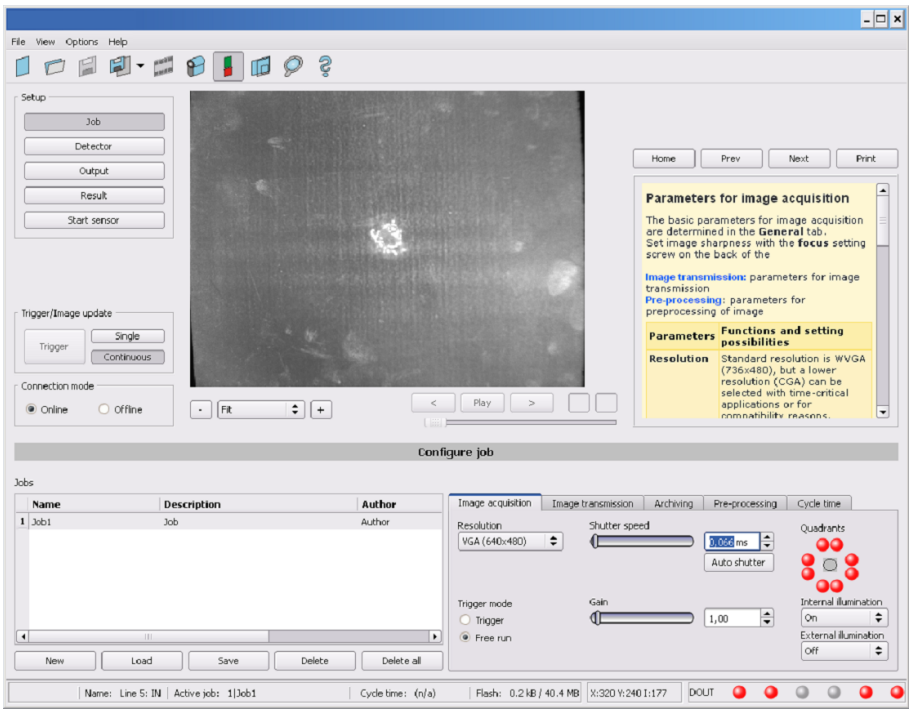


Fig. 9: Alignment for a vertical illumination

3.1.4 Assembly Vision Sensor - Mounting bracket SBAM-C6-CP

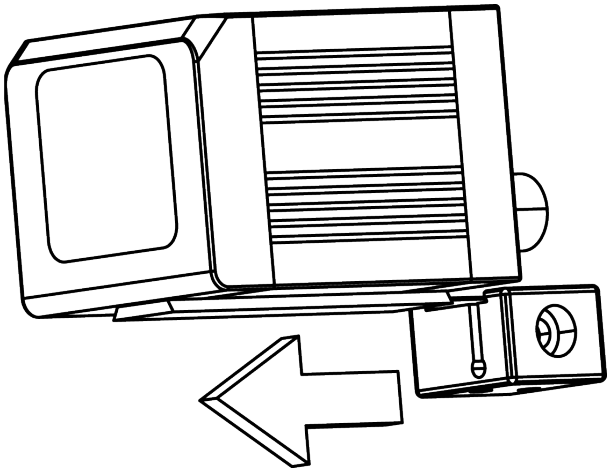


Fig. 10: Assembly Vision Sensor - Mounting bracket SBAM-C6-CP

For fixing the Vision Sensor on a fixing system / machine housing, slide the provided dovetail mounting bracket SBAM-C6-CP on the dovetail guide at the bottom side of the Vision Sensor and fix it at the desired position with the hexagon socket in the cross hole of the mounting bracket.

3.2 Electrical installation

The electrical installation of the Vision Sensor must be carried out by a qualified person. When installing the Vision Sensor, disconnect all electrical components from the power supply. When the unit is being used in a network, ensure that the network address (IP address) of the Vision Sensor set by the manufacturer at 192.168.100.100 is free and is not in use for any other unit connected to the system.

If necessary, re-set the IP address of the Vision Sensor as described in the section „Network settings“.

When the Vision Sensor is in use, the protective caps supplied must be pushed onto the M12 sockets (data and LAN) which are not in use. For error free operation the length of the connecting cables must not be longer than 30 m (except Ethernet cable). Failure to do this may cause malfunction.

3.2.1 Connection possibilities

For stand-alone operation (independent of PC /PLC) only connection 24 V DC is required afterstart-up.

For electrical installation, connect wires as follows:
***A: LED display**
***B: Focussing screw**
***C: 24 VDC, I/O- M12 connection socket**
***D: Data (RS422) M12 socket** (Version Code Reader only)
***E: LAN M12 connection socket**

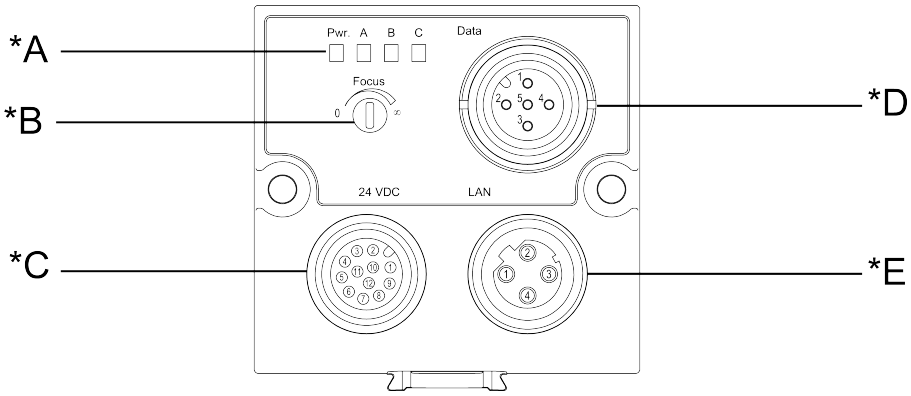


Fig. 11: Connectors Vision Sensor

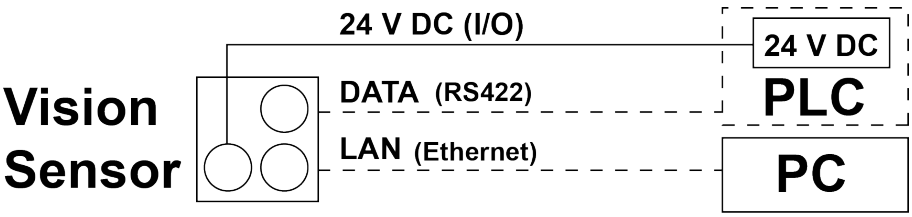


Fig. 12: Connection Vision Sensor

3.2.1.1 LED Display

Name	Colour	Meaning
Pwr.	green	Operating voltage
A	yellow	Result 1
B	yellow	Result 2
C	yellow	Result 3

All LED´s are set without taking into account any timing function (e.g. Trigger delay)

3.2.1.2 Focussing screw

Focussing screw to adjust focus.
Focus: Clockwise = higher distance
Counter Clockwise = lower distance

3.2.1.3 24 V DC Connection

M12 Connection socket for 24 V DC voltage supply and digital I/O.
For the exact plug connection see PIN assignment, connection 24 V DC

3.2.1.4 LAN Connection

M12 Connection socket for Ethernet connection.
For the exact plug connection see PIN assignment, connection LAN .
Use only the correct network cables.

3.2.1.4.1 Direct connection of the Vision Sensor to a PC (recommended)

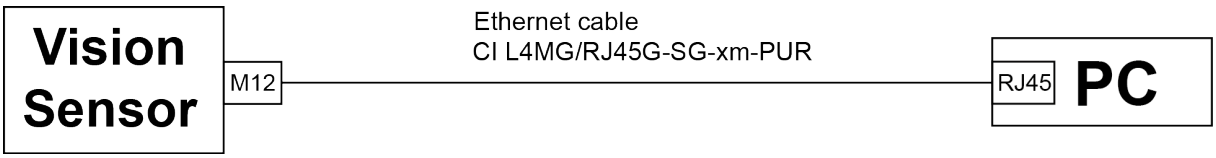


Fig. 13: Direct connection Vision Sensor <> PC

3.2.1.4.2 Connection of the Vision Sensor to a PC via a network:

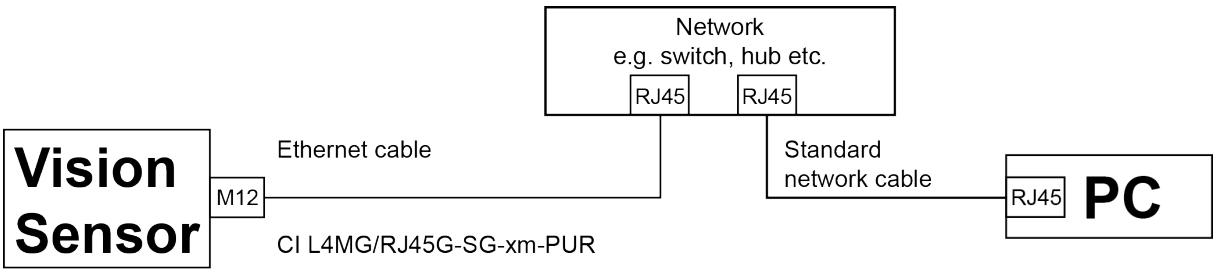


Fig. 14: Connection via a network

3.2.1.5 Data Connection

M12 Connection socket for DATA serial interface, RS422 / RS232.
s. PIN assignment DATA *A) (Page 20)

3.2.2 Plug connections

All pin assignments and signals are referring to the view from the sensor.

3.2.2.1 PIN assignment, connection 24 V DC

PIN	Colour	Use
1	BN	+ Ub (24V DC)
2	BU	GND
3	WH	IN (external trigger)
4	GN	READY *1
5 *2	PK	IN/OUT (encoder B+)
6 *2	YE	IN/OUT
7 *2	BK	IN/OUT, LED B*4
8 *2	GY	IN/OUT, LED C*4
9	RD	OUT (external illumination)
10	VT	IN (encoder A+)
11	GYPK	VALID *3
12	RDBU	OUT (ejector, max. 100mA), LED A*4

*1 Ready: Ready for next ext. trigger.
*2 Switchable input- output
*3 VALID: shows available results
*4 All LED´s are set without taking into account any timing function (e.g. Trigger delay)

For shielded cables use shield.

3.2.2.2 PIN assignment, connection LAN

(M12) 4 pin	Signal
1	TxD+
2	RxD+
3	TxD-
4	RxD-

3.2.2.3 PIN assignment DATA *A)

PIN	Colour	Use RS422	use RS232
1	brown	RxD+	Rx
2	white	RxD-	NC
3	blue	TxD+	NC
4	black	TxD-	Tx
5	grey	GND	GND

*A) Not with Object- Standard version

For shielded cables use shield.

3.2.2.4 Exemplary connection plan and software settings for the following setup:

- Power supply
- Trigger
- 1x digital output
- Encoder
- Ethernet to PC or PLC

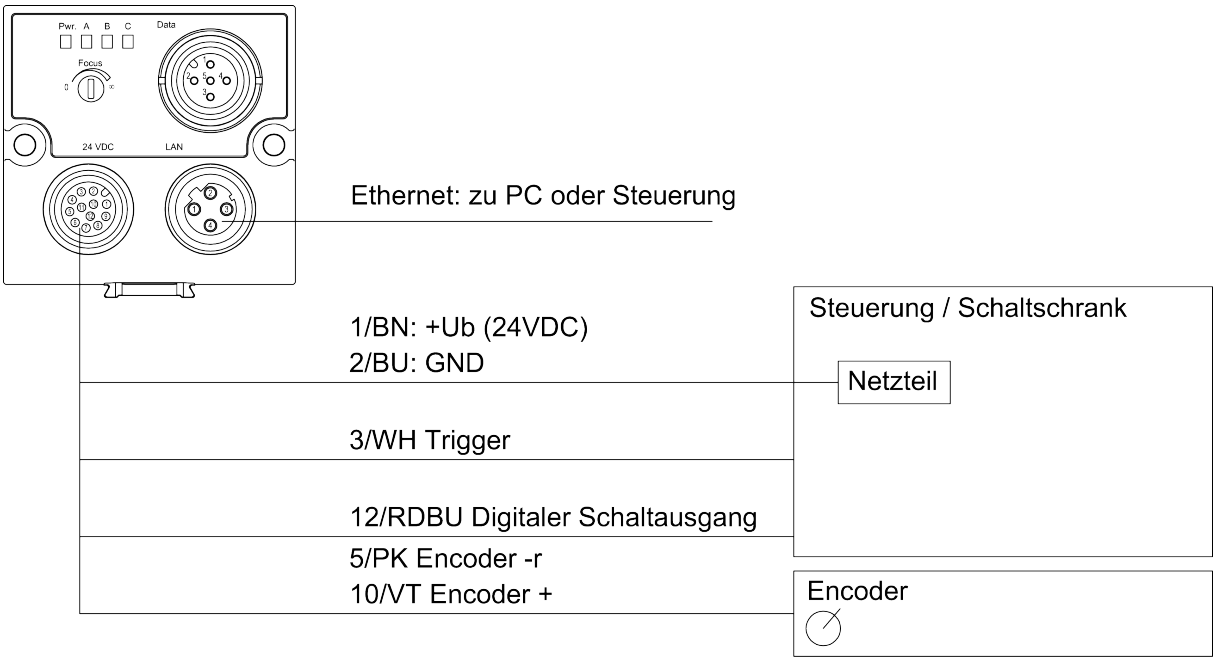


Fig. 15: Exemplary connection plan

3.2.2.5 Electrical connection supply voltage and shield

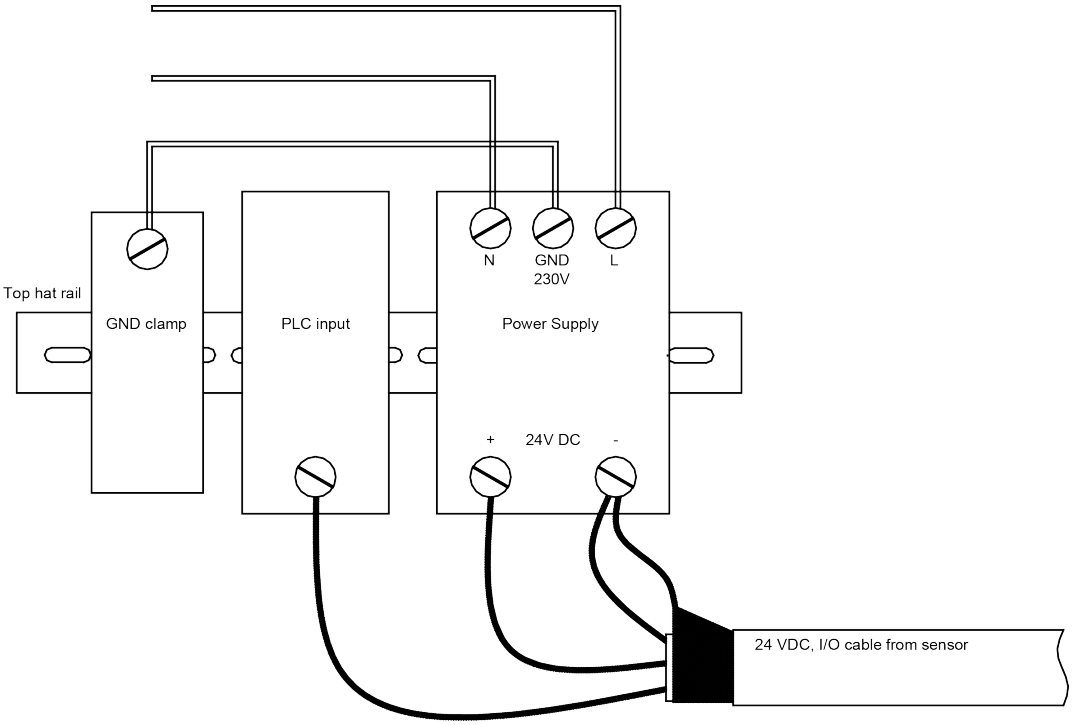


Fig. 16: Electrical connection, supply voltage 24VDC in cabinet with shield

3.2.2.6 Electrical connection PNP / NPN

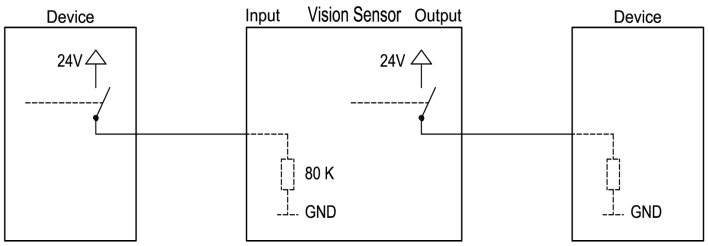


Fig. 17: Connection example Vision Sensor in PNP mode. In-/outputs switch to +24V

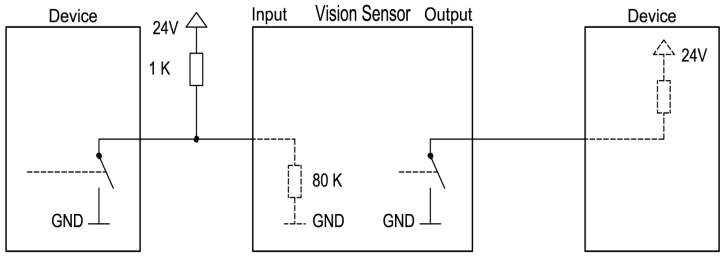


Fig. 18: Connection example Vision Sensor in NPN mode

As the inputs refer to ground, an additional pull-up resistor may be required in order to increase the input voltage to 24V when unswitched. The outputs switch to ground.

3.3 Network settings, Short reference

The following instructions indicate how to change the network configuration of the PC and the Vision Sensor. If incorrect settings are used, the network connections in the computer may be lost. To be on the safe side, note the former settings for later use if required.

Following this procedure, it may be necessary to re-start the system. In order to determine which IP addresses are allowed in your network or locally in your PC, and to carry out the necessary settings on your PC, contact the system administrator beforehand.

The illustrations, dialogues and menus originate from the operating system Microsoft WindowsXP™. The illustrations are similar in other operating systems.

3.3.1 Basic settings for PC and Vision Sensor

To configure the Vision Sensor with a PC it is essential that a network board and the TCP/IP LAN- connection is installed on the PC (This also applies when the PC is not connected to a network). The Vision Sensor supports the automatic recognition of the Ethernet transmission rate, but 100 MBit at the most.

The internet protocol IPv4 must be activated.

There are two alternatives to configure and parameterize the Vision Sensor.

See also chap. Network connection

1. Direct Connection

2. Network Connection

3.3.2 Direct Connection - Setting the IP Address of the PC

To connect the Vision Sensor to a PC via Ethernet the IP addresses of both devices have to correspond. The default IP of the Vision Sensor is 192.168.100.100 with Subnet mask = 255.255.255.0. To establish a direct connection, the PC must be set to a corresponding, fixed IP address like follows.

1. Click on Start / Control Panel / Network Connection / LAN Connection / Properties, the window "Local Area Connection Properties" opens.
2. In the list „This connection requires following elements“ select the option „Internet Protocol (TCP/IP)“ and then click the button „Properties“.
3. In the following window set the desired IP address of the PC and the sub-network data.
4. Confirm entries with OK

Example:

The Vision Sensor is pre-set to IP address 192.168.100.100 and subnet mask 255.255.255.0.
In this case, the IP address may be set to any value between 192.168.100.1 and 192.168.100.254, with a sub-net mask 255.255.255.0, with the exception of the sensor IP address (192.168.100.100).
To alter the sensor's IP address, see chap. Please do also not use the addresses .0 and .255 as these addresses are reserved for network infrastructure devices such as servers, gateways, etc.

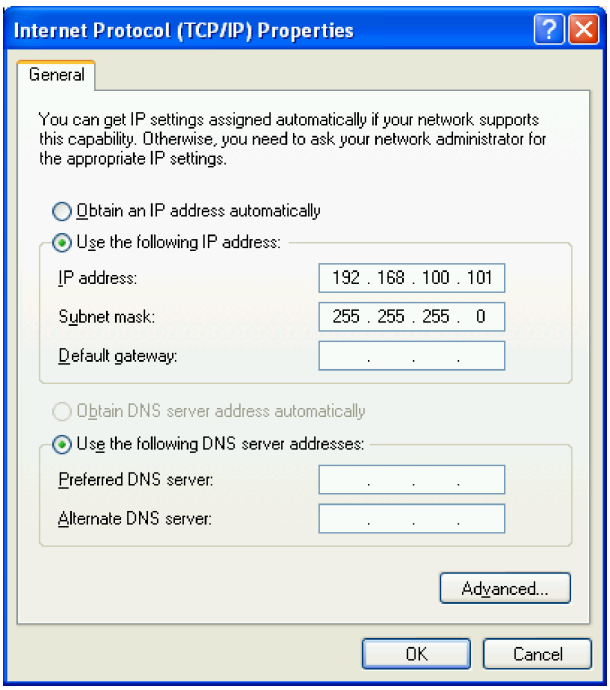

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 100 . 101
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Fig. 19: PC IP Setup

3.3.3 Network Connection - Setting the IP address of the Vision Sensor

Before connecting the sensor in the network, check with the network administrator whether the sensor's address has already been assigned (default: 192.168.100.100 with subnet mask 255.255.255.0). This can otherwise cause network failure. The set IP address is to be noted on the enclosed label. The label is then to be stuck on the sensor in a clearly visible place after installation.

Network connection speed:

The sensor must only be operated with 100MBit/full-duplex when using VGA resolution (or higher) and Vision Sensor Visualisation Studio.

Sensor's IP still free:

Connect sensor to network and then set the sensor's IP to match the PC according to the administrator's specifications, as follows, beginning with 2.

Sensor IP already assigned:

1. First connect sensor and PC directly and set an authorised IP address in the sensor.
2. Connection via the network can then be carried out. First ensure electrical connection and installation of PC software has been completed. To set the IP address on the Vision Sensor, the following steps are to be carried out in the PC software:
    a. Start Vision Sensor Device Manager software
    b. Select the required Vision Sensor sensor from the active sensor list (single left mouse click)
    c. Set sensor's new IP address with the "Set" button. Follow the on screen prompts. The IP address is assigned by your system administrator. The PC's IP address is shown in the status bar under the buttons. (Please note some pc's have more than one Ethernet connection i.e. wireless and wired LAN connections
    d. When the new IP address has been set, Re-select the sensor and connect. Via Config or View

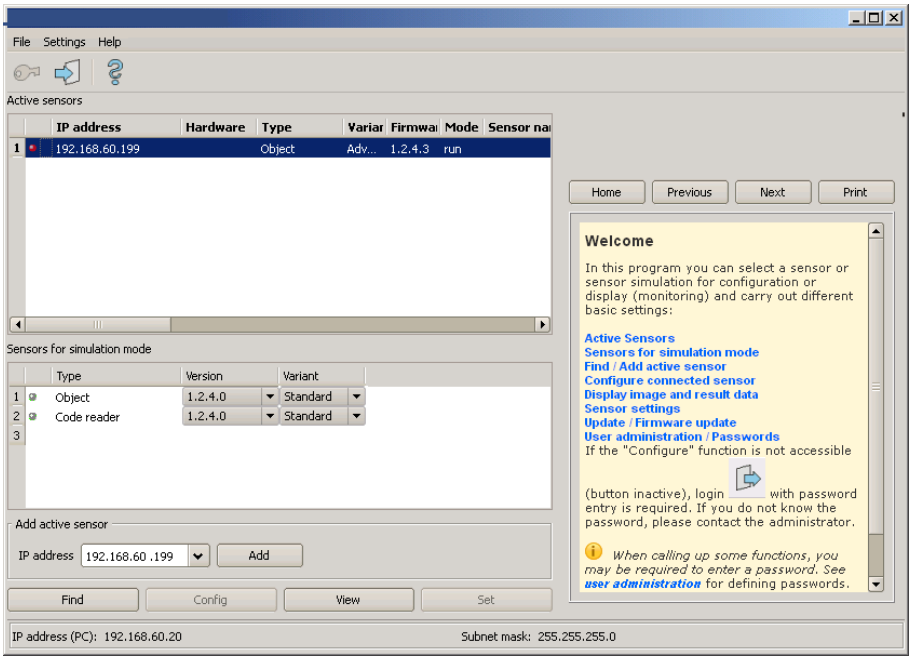

File Settings Help
Active sensors
IP address Hardware Type Variar Firmwai Mode Sensor nai
192.168.60.199 Object Adv... 1.2.4.3 run
Home Previous Next Print
Welcome
In this program you can select a sensor or sensor simulation for configuration or display (monitoring) and carry out different basic settings:
Active Sensors
Sensors for simulation mode
Find / Add active sensor
Configure connected sensor
Display image and result data
Sensor settings
Update / Firmware update
User administration / Passwords
If the "Configure" function is not accessible
(button inactive), login with password entry is required. If you do not know the password, please contact the administrator.
When calling up some functions, you may be required to enter a password. See user administration for defining passwords.
Sensors for simulation mode
Type Version Variant
Object 1.2.4.0 Standard
Code reader 1.2.4.0 Standard
Add active sensor
IP address 192.168.60 .199 Add
Find Config View Set
IP address (PC): 192.168.60.20
Subnet mask: 255.255.255.0

Fig. 20: Vision Sensor Device Manager

Modification of the standard gateway enables operation in different sub-networks. Only alter this setting after consultation with your network administrator. Automatic integration of a new computer or sensor in the existing network without manual configuration is possible through DHCP. Normally, automatic supply of IP address must only be set on the sensor, the client. When the sensor is started in the network, it can obtain the IP address, net mask and gateway from a DHCP server. Activation of DHCP mode is carried out via the “Set” button by activating the checkbox “DHCP“. As one and the same Vision Sensor can thus have different IP addresses at different times, a sensor name must be attributed when activating the DHCP. Should several Vision Sensors be in one network, different names must be used.

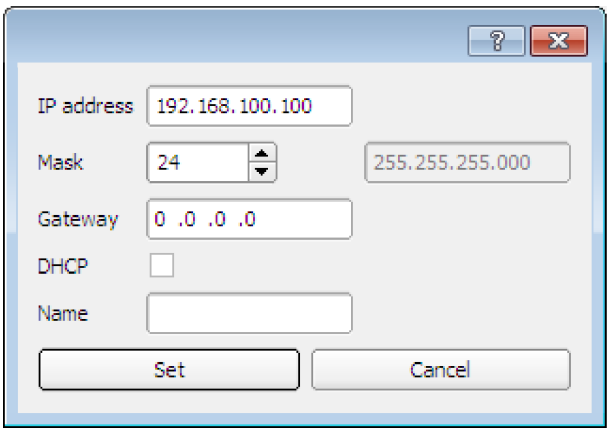


Fig. 21: Vision Sensor IP Setup

If a Vision Sensor with DHCP is switched on in a network without a DHCP server, the Vision Sensor automatically sets the IP address to 192.168.100.100. This can be the case, e.g. in the case of power/server failure or the restart of the system after shutdown as the DHCP server may boot slower than the Vision Sensor. Make sure that the Vision Sensor is only switched on when the DHCP server is available.

4 Vision Sensor – Operating- and configuration software

4.1 Vision Sensor – Operating- and configuration software - Overview

4.1.1 Structure of PC software

The PC software is organised into the following three sections:

- Vision Sensor – Operating- and configuration software – Short introduction (Page 27)
  For selection of a Vision Sensor sensor, or a sensor simulation model, for configuration with the "Vision Sensor Configuration Studio" tool or display (monitoring) with the "Vision Sensor Visualisation Studio" tool, or modification of different system settings such as IP addresses, firmware updates with the "Set" tool.
- **Vision Sensor Configuration Studio:**
  Complete set of functions to configure and test Vision Sensor for one or several inspection tasks (jobs) in six simple logical operating steps.
- **Vision Sensor Visualisation Studio:**
  For the display and monitoring of images and results from connected sensors, as well as job switch and job upload.

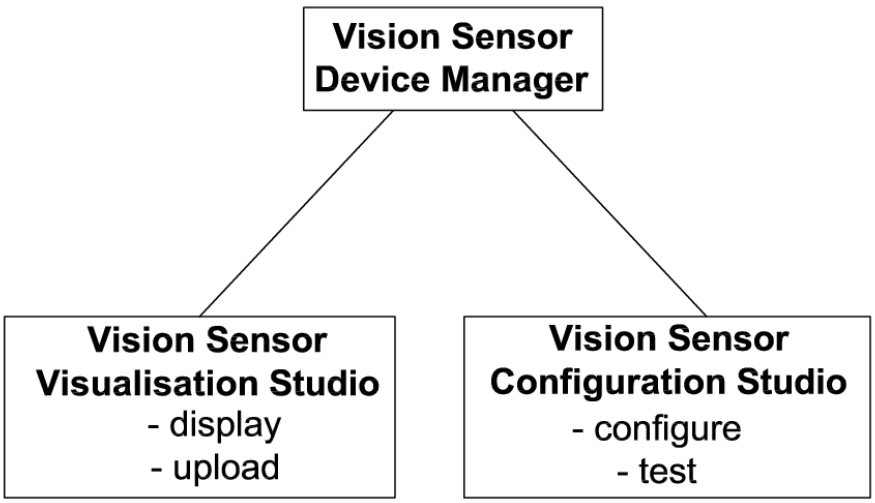


Fig. 22: Software structure

4.1.2 Context help

For all software functions a context sensitive help page is available and displayed as soon as a function is selected.

All available help pages can be viewed by pressing the Help- button („?“ symbol) or by double click to the online help window. There you also can do a keyword search. In comparison to the context help the size of this help window can be enlarged to view longer text more comfortable.

12.05.2014

4.2 Vision Sensor – Operating- and configuration software – Short introduction

(Example: Object sensor)

4.2.1 Vision Sensor, Short introduction, Starting the software

This short guide explains step by step the procedure for setting an example inspection task on the vision sensor

To start the Vision Sensor application click to the desktop icon "Vision Sensor“.

Fig. 23: Icon Vision Sensor

4.2.2 Vision Sensor Device Manager: Open sensors or sensor simulation / Passwords

In this program, you can select a sensor or a sensor simulation for configuration or display (monitoring) and carry out different basic settings.

Next topic: Vision Sensor Configuration Studio: Setting sensor, Job (Page 31)

Configuring or displaying sensors

In order to open a sensor for configuration or display, select with a single left mouse click the required sensor in the "Active sensors“ list, then click on the button "Config“ to start the "Vision Sensor Configuration Studio“ software, or on the button "View“ for the "Vision Sensor Visualisation Studio“ software.

Sensor simulation

To open a sensor for offline simulation, select the required sensor in the "Sensors for simulation mode“ list, then click on the button "Config“ to start the module "Vision Sensor Configuration Studio“. Vision Sensor Visualisation Studio is not available for the simulation mode as there is no device to send the images for display.

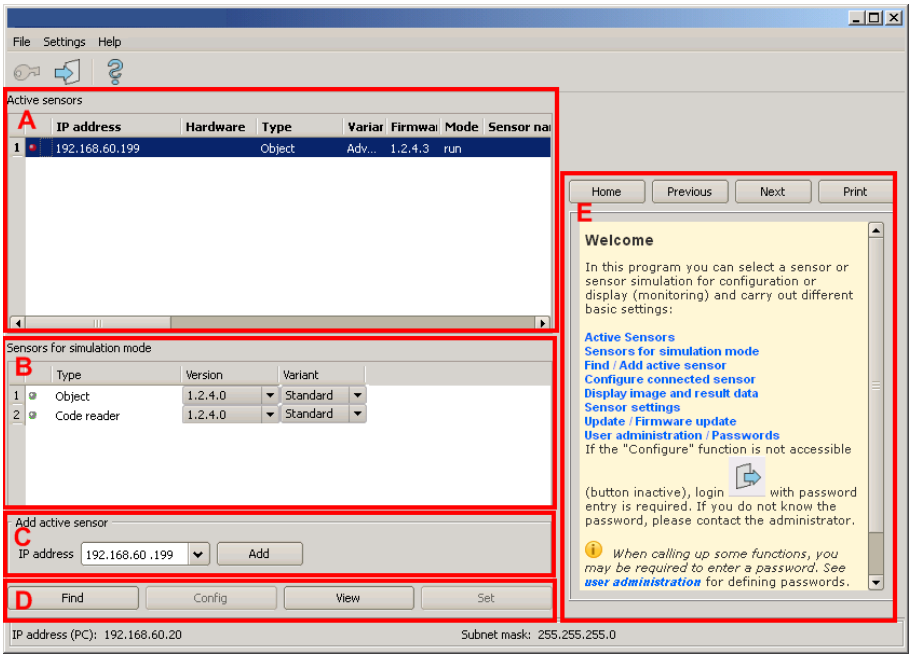

File Settings Help
Active sensors
A
IP address Hardware Type Variar Firmwai Mode Sensor nai
1 192.168.60.199 Object Adv... 1.2.4.3 run
Sensors for simulation mode
B
Type Version Variant
1 Object 1.2.4.0 Standard
2 Code reader 1.2.4.0 Standard
Add active sensor
C
IP address 192.168.60 .199 Add
D
Find Config View Set
IP address (PC): 192.168.60.20
Subnet mask: 255.255.255.0
Home Previous Next Print
E
Welcome
In this program you can select a sensor or sensor simulation for configuration or display (monitoring) and carry out different basic settings:
Active Sensors
Sensors for simulation mode
Find / Add active sensor
Configure connected sensor
Display image and result data
Sensor settings
Update / Firmware update
User administration / Passwords
If the "Configure" function is not accessible
(button inactive), login with password entry is required. If you do not know the password, please contact the administrator.
When calling up some functions, you may be required to enter a password. See user administration for defining passwords.

Fig. 24: Vision Sensor Device Manager Overview

A) Active sensors

This list displays all the Vision Sensors available on the network that can be controlled from the PC.

B) Sensors for simulation mode

All the sensors available for offline simulation are displayed here.

C) Add sensors via IP address

Sensors, which are not visible after starting the software or after clicking the "Find" button in Vision Sensor Device Manager, can be add manually with eheir IP address, if they are available in the network (e.g. after a gateway) and if the IP address is well-known. Via clicking the button "Add" such sensor con be found and are added to the list of active sensors, in order to edit them.

D) Functions

- **Find**

Activates another search procedure on the network to locate Vision Sensor products

- **Config**

Configures a connected sensor or a sensor simulation

- **View**

Displays image or result data from a connected sensor

- **Set**

Edits network settings such as the sensor's IP address etc.

E) Context help

Context sensitive help

4.2.3 Passwords

When first started-up after installation, password entry is completely deactivated and auto login is preset to administrator.

If parameter settings are to be protected from unauthorised access, passwords should be given for the "Admin“ and "User“ password levels, see below. This can be called up via the menu bar File / User administration or via the button with the key symbol in the toolbar.

Fig. 25: Password button

4.2.4 Password levels:

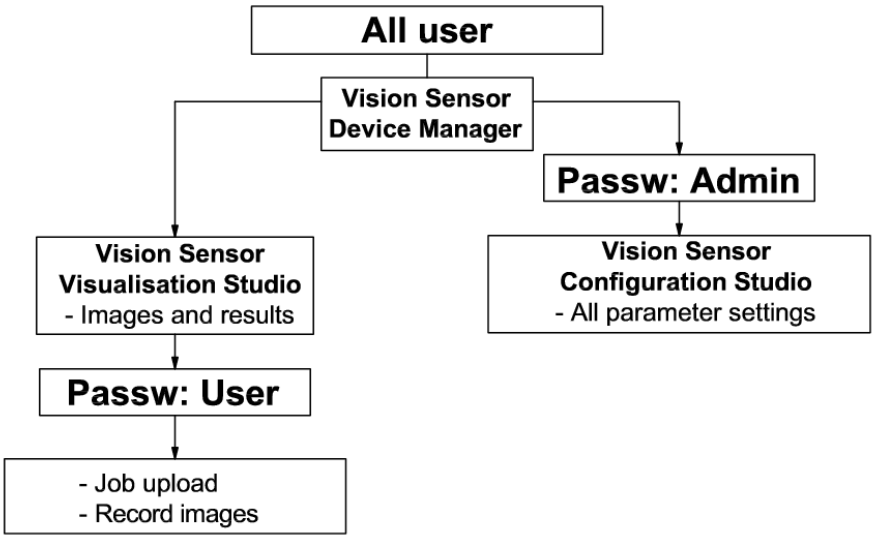


Fig. 26: Password levels

In order to be able to use the function "Config“ after the allocation of passwords, it is now necessary to login by clicking on the toolbar login button, and then entering the assigned password.

Fig. 27: Login button

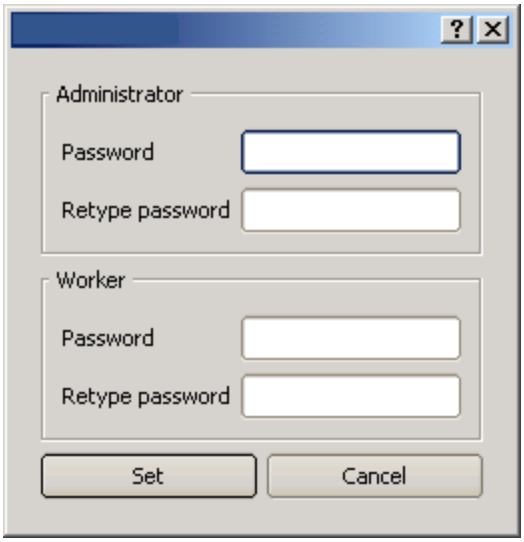


Fig. 28: Password input

Allocating an empty password means the password can be confirmed without any further entry. Activation of the "Deactivate password request“ checkbox, permanently deactivates password request.

If passwords have been assigned and then forgotten, it is possible to reset passwords to delivery status by reinstalling the software on the local PC.

4.3 Vision Sensor Configuration Studio: Setting sensor, Job

With this program, you can configure your Vision Sensor for one or several jobs in six simple logical operating steps.

Next topic: Alignment settings (Page 33)

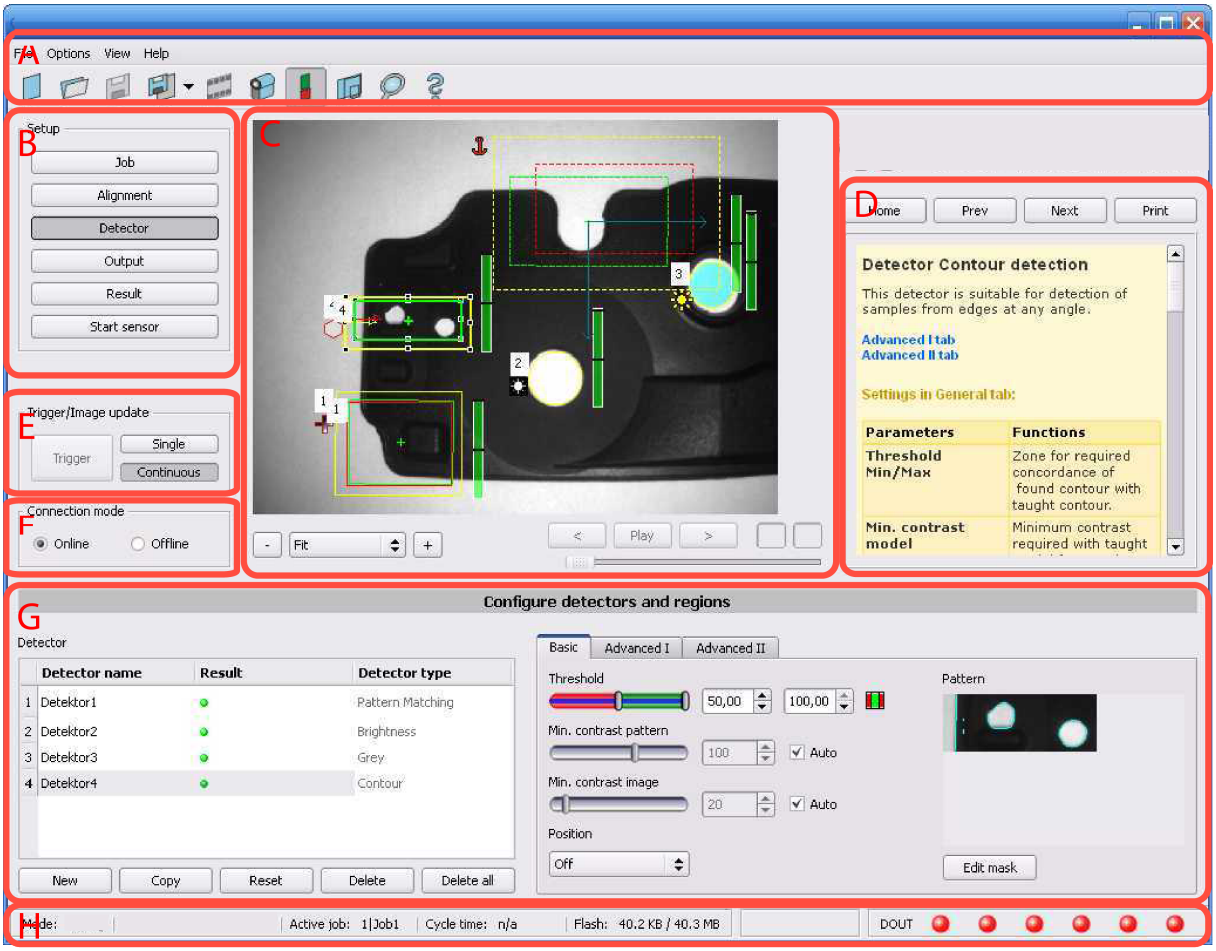


Fig. 29: Vision Sensor Configuration Studio

The fields are:

A) Menu and tool bar

B) Setup Navigation / Operating steps

See next chapter for description

C) Image

Image output with graphically adjustable operating and search zones as well as zoom function also filmstrip navigation when in simulation mode

D) Context

Context-sensitive online help, automatically updated for each action.

E) Image acquisition mode

Switch-over between continuous (free run) and single image mode with trigger input (either from sensor or via onscreen button)

F) Connection mode

Switch-over between online and offline mode (sensor present or simulation without sensor)

G) Job selection

Changing variable content relating to action in set-up navigation, for setting of associated parameters.

H) Status bar

Different status information including Mode / Name of Vision Sensor / Active job. In Run Mode: Cycle time / cursor x/y location and pixel intensity / individual I/O on /off indication (like configured in "Output/Digital output").

4.3.1 Job Setup

Configuring a job

To configure a job, edit the job entry in the "Select job" field or e.g. create a new job. Set global parameters here, such as shutter, exposure or the resolution which is valid for the entire job.

For Job- setup: in Setup/Job edit or generate a new job in field "Jobs".

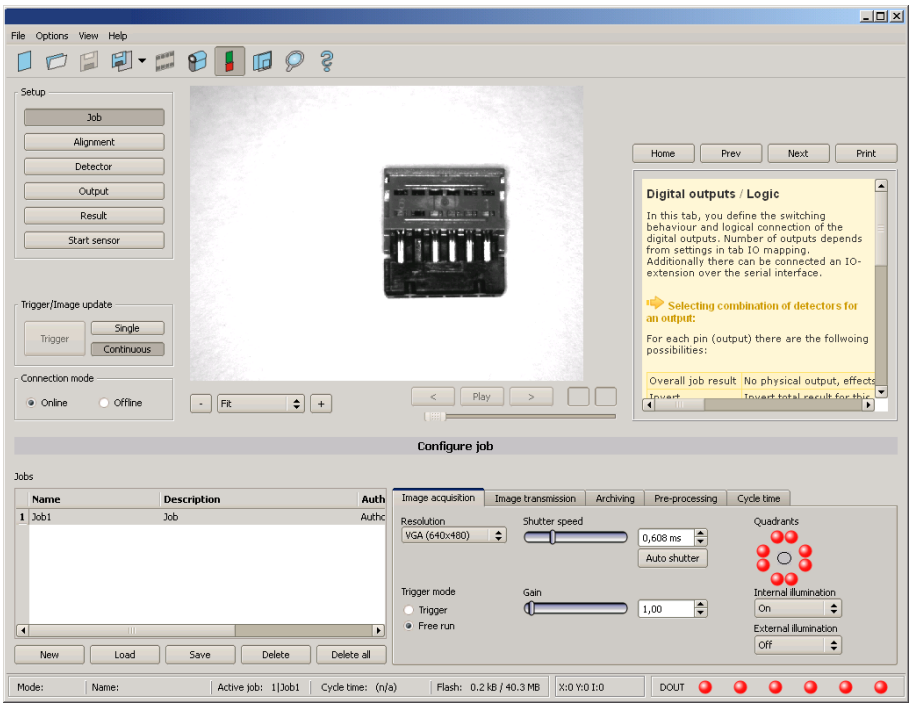


Fig. 30: Vision Sensor Configuration Studio Job

One job contains all settings and parameters necessary to perform a specific inspection task.

Jobs are created here, and several jobs can be stored in the Vision Sensor. All global settings, valid for each individual job, e.g. shutter, gain, illumination settings etc. are also carried out here.

- The following basic image settings should first be made to ensure a high-contrast and sharp image:
  * Image brightness: Set shutter or amplification, see Job/General
  * Image sharpness: Focus setting via the screw on the back of the Vision Sensor camera itself
- When delivered, the factory settings are trigger mode = "free run" (see Job/General) and image acquisition mode = "continuous" . A new image is continuously displayed for easier focus and brightness set up.
- The subsequent setting of alignment and detectors should preferably be carried out in single image mode, as all settings are then based on a master image and image collection is not continuously carried out.
- Alignment and multiple different detectors can subsequently be defined within one job to solve an inspection task.

4.3.2 Alignment settings

Alignment compensation can be necessary for objects whose position varies on the screen.

Next topic: Detector settings (Page 34)

Set the working zones on the parameter to be used for alignment tracking by adjusting the graphic frame to the appropriate position and size on the image.

The associated parameters are displayed on the bottom right-hand side and can also be adjusted there.

Alignment, when used, affects the positions of all the detectors subsequently defined in this job.

In this example, the outside contour is used for alignment and the plug can be found either by contour or by pattern matching. If the angular rotation of the object can vary also, the contour method must be used.

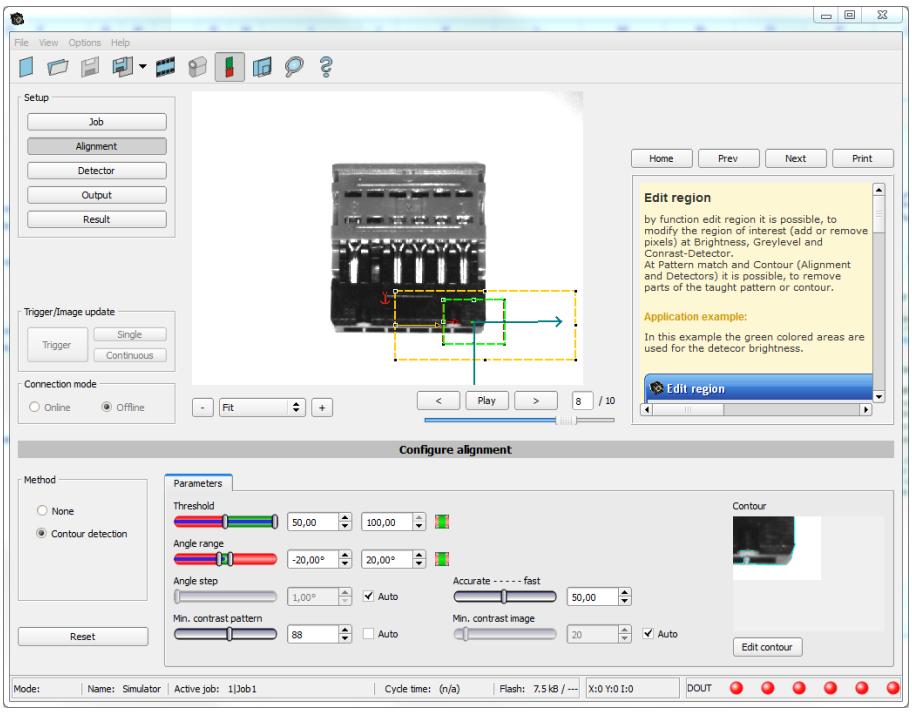


Fig. 31: Alignment

4.3.3 Detector settings

Different detectors can be selected and adjusted to solve an inspection task. First the required detector is selected in the dialog box shown below.

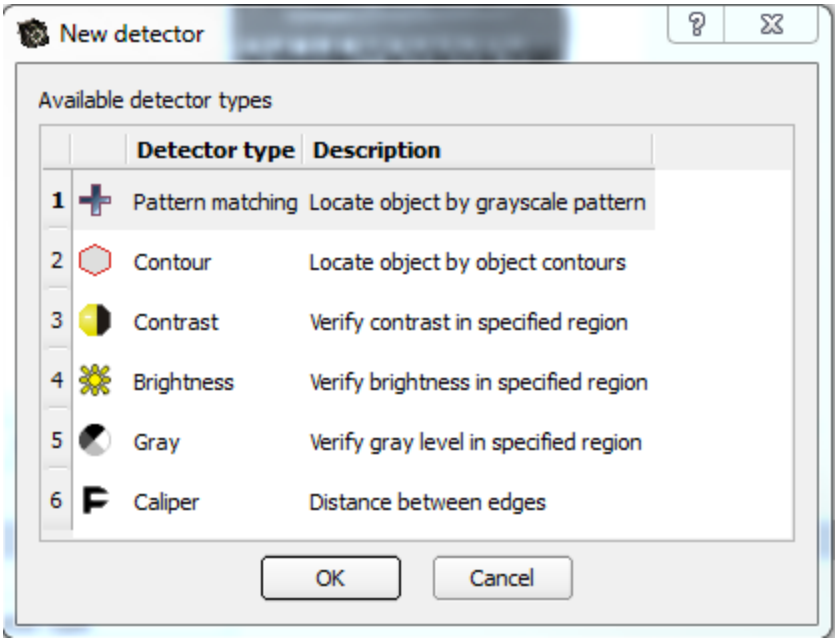

New detector
Available detector types
Detector type
Description
1 Pattern matching Locate object by grayscale pattern
2 Contour Locate object by object contours
3 Contrast Verify contrast in specified region
4 Brightness Verify brightness in specified region
5 Gray Verify gray level in specified region
6 Caliper Distance between edges
OK
Cancel

Fig. 32: Detector list, Object sensor

Then the working and search zones are graphically set on the screen. If “teach zones” (red outline) exist, they are taught immediately after completion of the settings. All the detectors defined in this job are shown in the bottom left-hand corner. The parameters of the currently selected detector are shown in the bottom right-hand corner and can be adjusted there.

If other parameters are to be checked on the same part, many other detectors can be created as described above by clicking on "New".

In the example two brightness detectors are defined to check the presence of metal contacts in a plastic connector housing.

Detector 1: contact found (brightness value is in defined range as the shiny metal contact is mounted) result positive.

Detector 2: contact not found (brightness value out of defined range, as only weak reflection from the black plastic housing background) result negative.

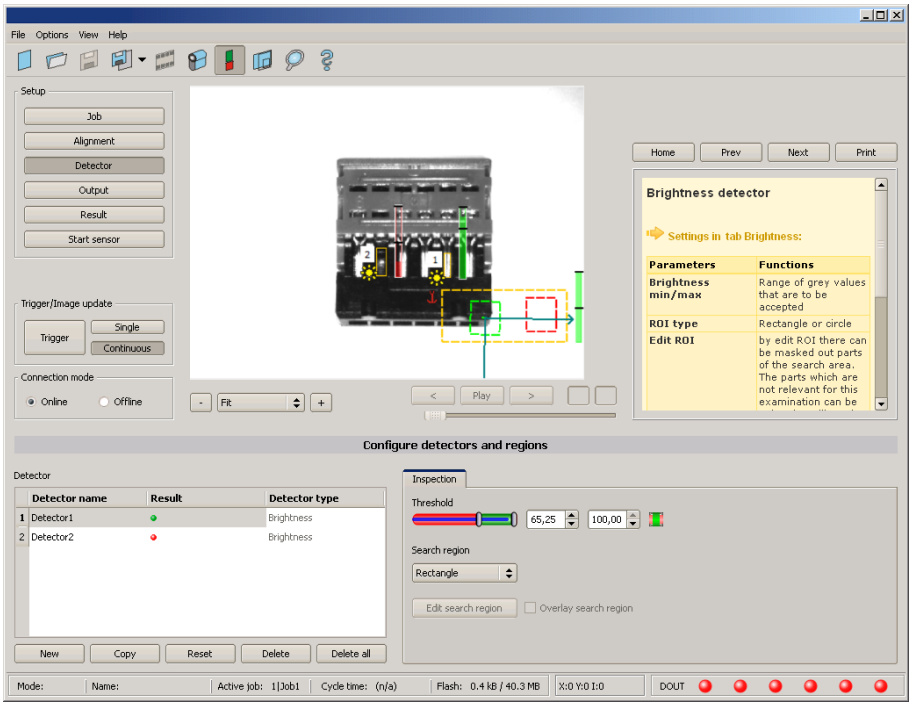


Fig. 33: Detector settings

4.3.4 Output, I/O and data output

The output module enables different settings of digital inputs/outputs and data output.

Select and activate the interfaces in the different tabs. Logically connect detector results and assign to the available I/O´s.

In order to enable the output of serial result data, select the required interface and compose data string.

Next topic:Result (Page 37)

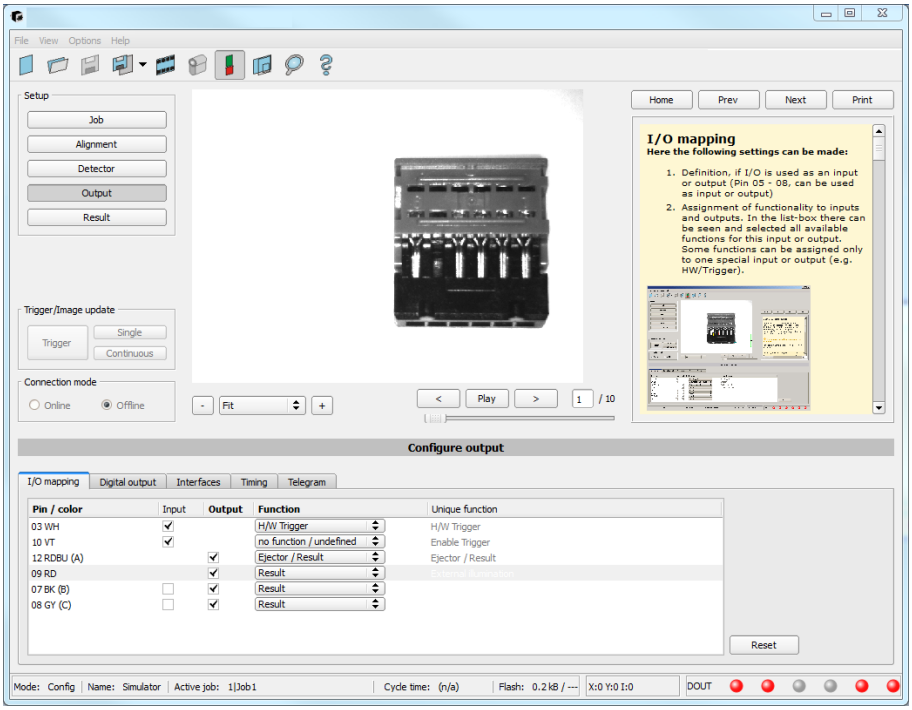


Fig. 34: Output, digital and data

Setting possibilities in the different tabs:

- **I/O mapping**
  Settings for the I/O Hardware configuration.
- **Digital Output**
  Selection of digital signal outputs and definition and assignment of logical connection using the Boolean results of all detectors. Definition of complex logic connections via table or via input of a logical formula.
  A different logical connection can be assigned to each available digital output.
- **Interfaces**
  Selection, setting and activation of the individual interfaces such as: programmable input IN2, RS422, I/O extension, Ethernet and Ethernet/IP
- **Timing**
  Setting of delay times: Trigger delay, result delay and duration of result
- **Telegram**
  Setting and preview of data output string via RS422 or Ethernet.
  Selection of: binary or ASCII protocol, header and/or trailer, standard contents and/or flexible, combinable, special individual data from the individual detectors.
  Any number of individual results from all the defined detectors can be freely arranged in an output string.

4.3.5 Result

With this function, an inspection is carried out on the PC for control purposes, using all the settings made. All the results are produced and displayed just as on the sensor. However e.g. execution times will not be updated as these values are only informative when implemented on the sensor itself. See next step: „Start Sensor“.

Next topic: Start sensor (Page 38)

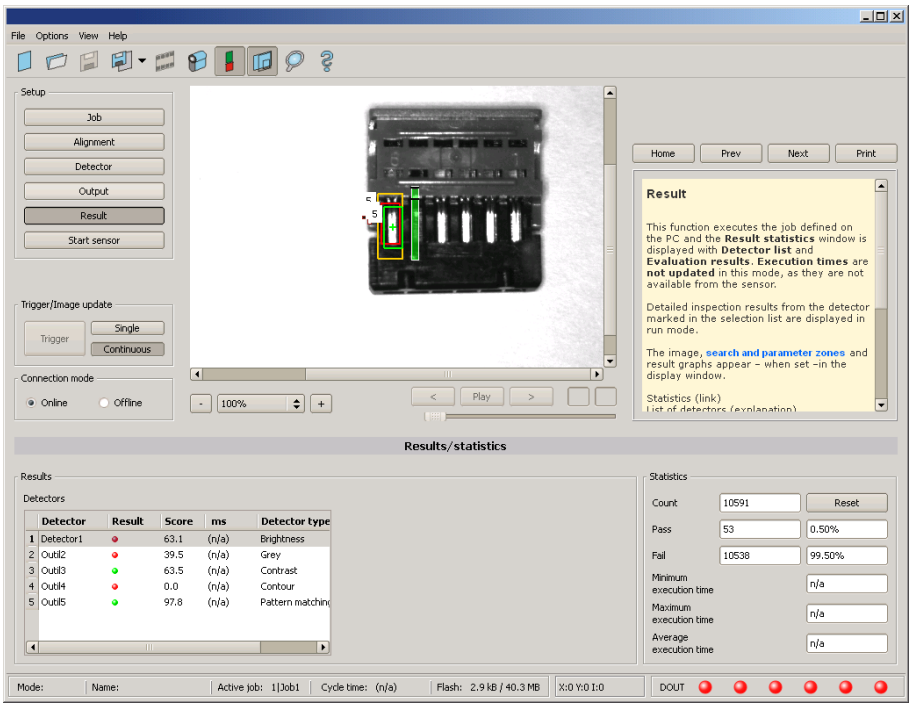


Fig. 35: Result display

4.3.6 Start sensor

When this function is activated, all settings are transferred to the sensor, stored in the flash memory and carried out in e.g. in free run or in triggered mode according to the settings made. All information in the list of detectors, result field or under „Statistics“ is updated here.

If using “triggered mode” then a trigger will be required from the external control system, alternatively a ‘software’ trigger can be sent using the Trigger button the left hand side of the image area.

Next topic: Vision Sensor Visualisation Studio, display images and results (Page 39)

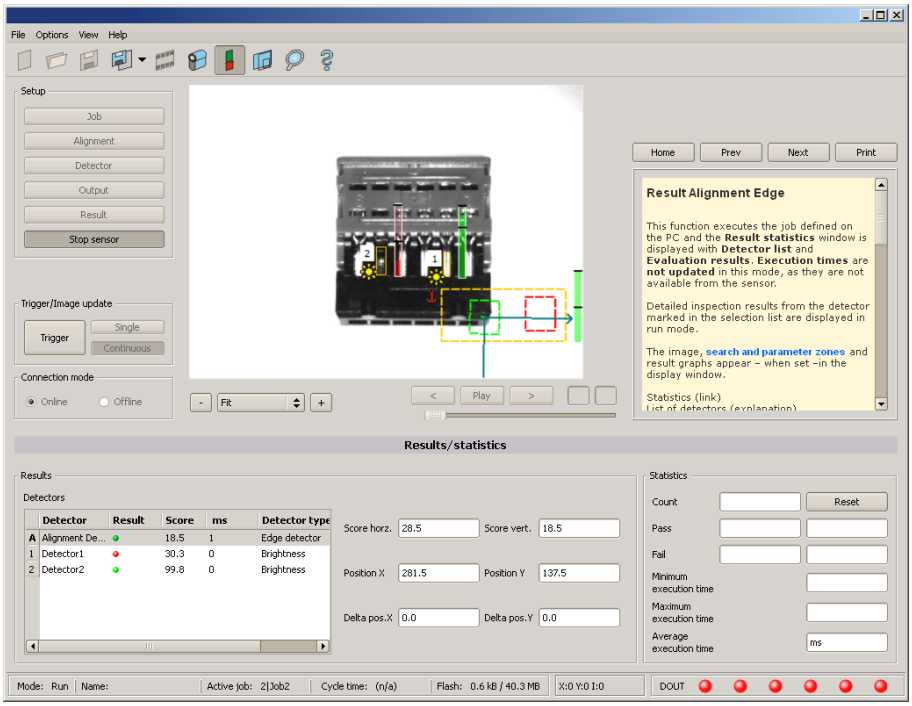


Fig. 36: Start sensor

4.4 Vision Sensor Visualisation Studio, display images and results

This program enables the monitoring/inspection of the connected sensor and the analysis of inspection results.

Click to the "**View"** button in the Vision Sensor Device Manager software to start the Vision Sensor Visualisation Studio module. (You can open multiple copies of this software if you are using multiple cameras on the system, however only one 'connection' is allowed to each Vision Sensor).

The current image is displayed with the drawings for alignment and the detectors (if „image transmission = active" is activated in the configuration module under Job/General).

The tab „**Result**" shows the individual detectors with their results and the overall result.
The tab „**Statistics**" shows further statistical results.
The "**Freeze image**" button enables result-controlled images (e.g.: bad part) to be kept on the display.
"**Zoom**" enlarges images.
With "**Archive images**", images and result data, as previously set under "File/Configure archiving", can be archived on the hard disk of a connected PC, with or without numerical result data.
With "**Rec. images**" the last 10 images can be retrieved from the Vision Sensor sensor.
In the tab „**Job**", it is possible to switch between jobs present on the sensor.
In the tab „**Upload**", further, previously defined jobs or whole job sets can be loaded from the Vision Sensor Visualisation Studio on to the sensor.

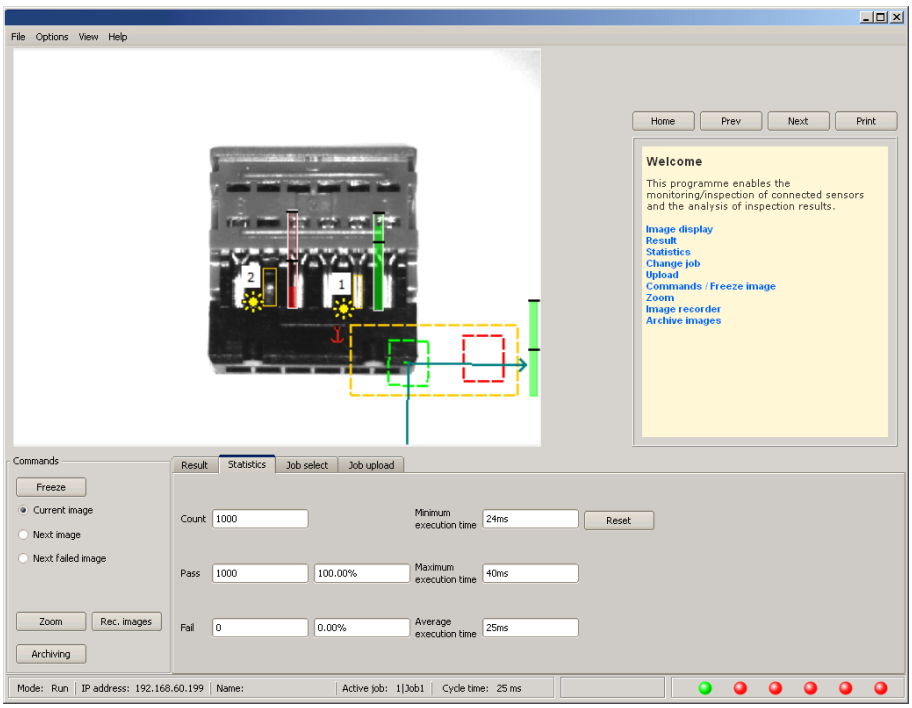
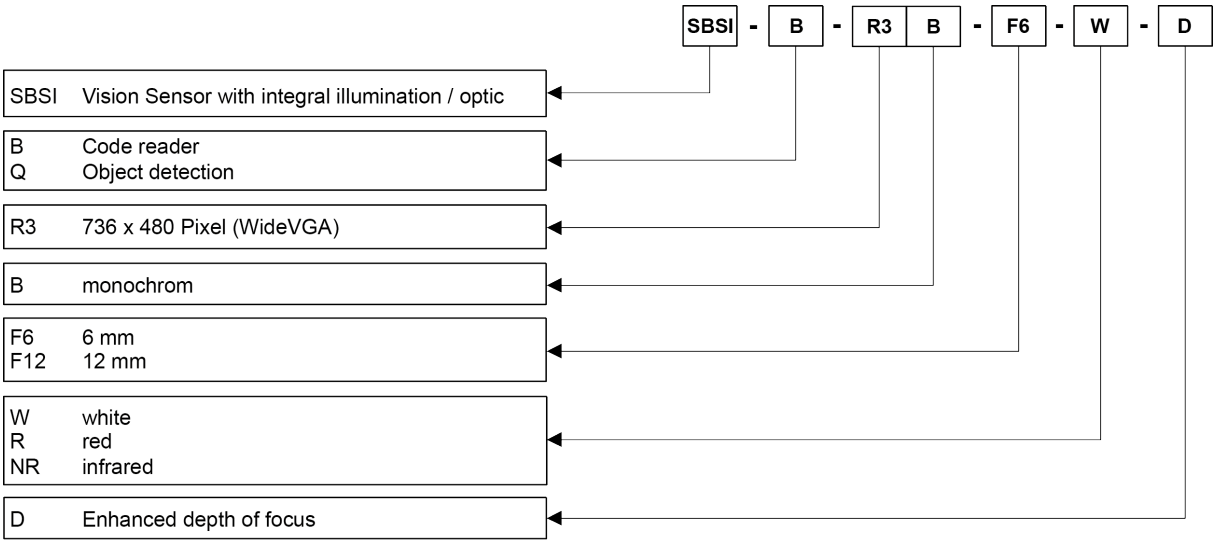


Fig. 37: Vision Sensor Visualisation Studio

5 Type key


SBSI - B - R3 B - F6 - W - D
SBSI Vision Sensor with integral illumination / optic
B Code reader
Q Object detection
R3 736 x 480 Pixel (WideVGA)
B monochrom
F6 6 mm
F12 12 mm
W white
R red
NR infrared
D Enhanced depth of focus

6 Technical Data

Electrical data	
Operating voltage	U_B 24 V DC , -25% / + 10%
Residual ripple	< 5 Vss
Current consumption (no I/O)	≤ 200 mA
All inputs	PNP / NPN High > U_B - 1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Outputs	PNP / NPN
Maximum output current (per output)	50 mA, Ejector (Pin 12 / RDBU) 100 mA
Short-circuit protection (all outputs)	yes
Inductive load	typ.: Relays 17K / 2H, pneumatic valve 1.4K / 190mH
Protection against inverse polarity	yes
Interfaces Vision Sensor-XX-Standard	Ethernet (LAN)
Readiness delay	Typ. 13 s after power on
Optical data	
Number of pixels , chip size, pixel size Technology	Vision Sensor- R3...: 736 (H) x 480 (V), 1/3", 6,0 um square CMOS (mono)
Integrated scan illumination	8 LEDs
Integrated lens, focal length	6 or 12 mm, adjustable focus
Lens (adjustable to infinity) Min. scan distance Min. field of view X x Y	R3 | R3 6 | 12 6 | 30 5 x 4 | 8 x 6
Mechanical data	
Length x width x height	65 x 45 x 45 mm (without plug)
Weight	approx.160 g
Vibration / shock	EN 60947-5-2
Ambient operating temperature	0° C .... 50° C (80% humidity, non-condensing)

Storage temperature	-20° C ... 60° C (80% humidity, non-condensing)
Protective system	IP 67
Plug connection	24V DC and I/O M12 12-pin, LAN M12 4-pin, Data M12 5-pin
Housing material	aluminium, plastic

Function and characteristics	
Object detection	
Number of jobs / detectors	Vision Sensor-XX-Standard: 2 / 32
Evaluation modes	• alignment • contour match with/without position detection • pattern match with/without position detection • area test grey level • area test contrast • area test brightness • direction info, or coordinates for position detection • Caliper, distances between edges
Typical cycle time	typ. 20 ms pattern matching typ. 30 ms contour typ. 2 ms area test
Code Reader	
Number of jobs / detectors	Vision Sensor-XX-Standard: 8 / 1
Evaluation modes	• DataMatrix Code acc. ECC200 in any rotational position, square and Rectangular. • QR-Code, Model 1 and Model 2, Version 1 . . . 40 • Barcode Interleaved 2 of 5, Code 39, EAN13-Gruppe (EAN8, EAN13, UPC-A, UPC-E), EAN128 (Codes A, B, C) • position and size of field of view freely adjustable • logic operation of single configuration (AND, OR = sorting) • verify
Typical cycle time	40 ms one evaluation Coder reading